Hub ports in Mexico:
limitations and opportunities

Carlos Martner Peyrelongue

Researcher,
Mexican Institute of Transport,
Professor, Autonomous
University of Querétaro, Mexico
Carlos.Martner@imt.mex

The subject of hub ports has become an increasingly important one in Latin America owing to the rapid growth of international goods flows that has resulted from trade liberalization and economic globalization. The aim of this paper is to reappraise hub ports in Mexico from a viewpoint that situates the unit of analysis in the global sphere, as the technological, organizational and geographical changes being undergone by ports and liner shipping worldwide largely determine the limitations and opportunities for port development in the country. In this initial approach to the subject, five criteria of analysis are established for ascertaining the opportunities and potential of Mexican ports operating liner sea container services within the new international maritime and port context. The paper ends by setting forth some general prospects and conclusions for consideration by actors, both public and private, concerned with port development.

I

Introduction

Hub ports have become the new development paradigm for Latin American sea transport and trade. It is a weak paradigm, undoubtedly, with little to sustain it, as it is based primarily on adaptation of the working methods, organization and technology of the central countries, but lacks the kind of conceptual basis that can draw on disciplines such as geography and transport economics to attain an understanding of the conditions, limitations and development opportunities of port complexes of this type in peripheral countries.[1]

In general terms, hub ports are characterized by the ability to attract cargo whose places of origin or destination (be they in the same country as the port or elsewhere) lie well outside their traditional hinterland or zone of influence. Cargo is concentrated in such ports in two main ways: by sea, when cargo bound for other ports is trans-shipped, and by land, as the port's hinterland grows to take in vast territories, perhaps extending beyond the country's borders.

There is virtually no country in Latin America that does not have some plan for a hub port on its shores. There is recurrent talk of developing megaports associated with bi-oceanic transport corridors. Hoffmann (2000) shows how every one of the countries on the South American Pacific seaboard has raised the possibility of one or more of its ports being raised to hub status. Mejillones in Chile, Callao in Peru, Manta and/or Guayaquil in Ecuador and Buenaventura in Colombia are among those most frequently mentioned. In the same paper, Hoffmann uses a broad conceptual approach to sum up recent port and international shipping tendencies, and warns of the difficulties and drawbacks of trying to create hubs in this part of the continent.

In Central America too there has been a welter of proposals for port and multimodal development. The most striking is the Nicaraguan proposal for an inter-oceanic canal; this would be a land bridge or dry canal that would entail the construction of railway lines and hub ports on the Pacific and Atlantic coasts. In Panama, progress has been made with a scheme to turn the port of Balboa into a regional hub. This port will undoubtedly benefit from the modernization of the railway linking it to the Manzanillo (Panama) International Terminal, situated on the Atlantic coast.

In the south of Mexico, meanwhile, consideration is being given to the possibility of developing the Isthmus of Tehuantepec corridor by converting the ports of Salina Cruz (Pacific) and Coatzacoalcos (Gulf of Mexico) and modernizing the highway and railway link between these two ports, which are situated on the narrowest and flattest part of the country. The aim of this project is to concentrate and redistribute large volumes of international cargo. Researchers and analysts also highlight the potential of the ports of Altamira and Veracruz on the Gulf of Mexico, and of Manzanillo and Lázaro Cárdenas on the Pacific, to become major cargo and redistribution hubs, although the public sector has taken a cautious attitude to the development of hub ports.

The idea that each country can have a hub port is of a piece with approaches in the social sciences that insist on circumscribing the unit of analysis to the boundaries of the nation State (Yocelevzky, 1999), and thus neutralize or dilute decision-making whose focus is on global conditions or, to put it another way, the "world system" (Braudel, 1985 and Wallerstein, 1996), creating great expectations that have only weak conceptual or empirical underpinnings.

This paper aims, then, to look at the issue of hub ports in Mexico from a viewpoint that places the unit of analysis on the global level, where the technology and organization of liner shipping, the new role of ports as logistical centres linking together increasingly globalized production chains, and the development of intermodalism are all coming to exercise a decisive influence on the viability of hub ports.

The main purpose of this initial approach to the subject is to establish elements of analysis or indicators to ascertain the situation and opportunities of Mexican ports operating liner sea container services within what

[1] The concepts of centre, semi-periphery and periphery are current in the field of economic geography and in the regional studies debate (see Benko and Lipietz, 1994). It is also relevant to note the increasingly multidisciplinary nature of the study of ports and transportation. Previous approaches, which centred almost exclusively upon economics or engineering, have been enriched by contributions from social science disciplines and subdisciplines such as transport geography and territorial and regional planning.

we have termed the global network of ports. In other words, the idea is to determine how high each of the liner ports can rise within this hierarchical network.

To this end, section II summarizes recent port and international maritime transport tendencies. Section III proposes five elements of analysis for determining the place and potential of the country's ports in the global system. The first is the volume and trend of containerized cargo flows; the second is the nature of the geographical space from which each port obtains cargo; the third is the level of modal integration in each port; the fourth is the location of each port in relation to the main international maritime trade corridors, and the fifth is the types of services with mainline and feeder routes, and changes in the number of operators integrated into the port. Lastly, section IV looks at future prospects and offers preliminary conclusions for port administrators, researchers and transport authorities, and for economic agents concerned with port development.

II

Recent port and international shipping tendencies

Since the second half of the 1990s, a great many research papers and articles have been written about the drastic restructuring of the world's ports and liner container shipping services.[2]

Ports and international sea transport play a crucial role in sustaining economic globalization and trade liberalization. In fact, many of the new techniques for integrating merchandise flows associated with fragmented production chains scattered around the planet were originally developed "out at sea" and introduced into the international system by the world's large shipping firms. This is not surprising if we consider that most international trade is conducted by sea.

1. Technological trends: from the container to giant ships and ports

The main technological and organizational changes underlying the development of intermodalism and "door-to-door" transport chains without cargo break-up originated in the shipping industry. At the same time, new actors appeared to create and coordinate the nascent intermodal transport networks, in particular the multimodal transport operator (MTO), whose role in designing, selecting and overseeing the transport chain is becoming ever more important.

From the technological point of view, the most significant milestone since the advent of the container has been the rapid increase in the size and carrying capacity of ships. The speed of large ships has also been progressively increasing.[3] Since economies of scale and the speed at which goods and transport equipment move are very important in international shipping, it was to be expected that the dynamism deriving from container use would stimulate technological changes in ship characteristics. The tendency towards giant ships has not stopped. In the last decade, the largest container ships doubled in size from 3,500 TEU[4] to 7,000 TEU capacity.

[2] Most of them have come out of the United States and Europe (Damas, 1995 and 1996; Kadar, 1996; Fossey, 1997 and De Monie, 1998, among others), although some studies have been produced recently in Latin America (Burkhalter, 1999 and Hoffmann, 1998 and 2000).

[3] Although experiments have been going on since the 1970s to develop very fast ships (over 30 knots), these have not been commercially viable owing to their limited carrying capacity. New versions of these fast ships have still not solved the problem, so they will only be used on very short routes. This is the case with the Tecno Super Liner, developed in Japan and tested during 2000, which can reach speeds of 45 knots but has a cargo capacity of just 1,400 metric tons (roughly 140 TEU). Having said this, container ships, which are commercially viable on intercontinental routes, have become considerably faster on average in the last two decades. According to data from the German shipping company Hapag-Lloyd, between 1984 and 1998 the speed of high-capacity container ships rose from 18 to 25 knots.

[4] TEU (twenty-foot equivalent unit) is the unit equivalent to a 20-foot-long container. It is the universally accepted unit for expressing both the cargo capacity of ships and other forms of transport and the container cargo volumes handled in intermodal ports and terminals.

Ships of this type are obviously used on the main international trade corridors, which are in the northern hemisphere, and for them to operate properly the international port system has had to change profoundly. The new dynamic of multimodal and sea transportation has meant that only the largest ports have been able to draw in large enough cargo volumes to make these ships profitable to operate. Megaterminals have been built at these ports, endowed with specialized high-performance equipment and the installations needed for large-scale movements. As far as is known, no container ship of the post-Panamax type has yet been used on north-south routes.

It is difficult to predict at present how large ships might become. It is plain, though, that the tendency towards giant ships will not halt any time soon, as is clearly demonstrated by the new shipbuilding orders being placed by the main shipping companies[5] and by the technological changes being made to intermodal ports and terminals.

The technological feasibility of building larger, faster ships is allowing shipping operators to restructure routes and services to capture larger market segments. Hoffmann (1998) has described another tendency that has recently become firmly established in liner shipping: the high degree of concentration that is emerging in the sector.

2. Alliances and mergers: growing concentration in international shipping

The process of concentration is characteristic of the globalized capitalist economy, so it is no novelty in itself. Given this, the tendency towards concentration in liner shipping seems inevitable.

What is perhaps striking in this phase is the shape and scale of concentration. The main shipping companies are not only increasing their size and market participation capacity by bringing in larger ships that can be used to move more cargo at lower cost, but are engaging in strategic alliances, takeovers or mergers with competitors. The strategic alliances and mergers being carried out by the so-called "megacarriers" (large multimodal and shipping consortia) undoubtedly amount to a firm new tendency that is giving rise to significant changes in the organization of international shipping and the position of ports.

The proliferation of alliances seems to be a response by carriers to the demands of globalized production and increasing deregulation of the maritime sector. The fact is that most shipping companies operating liner services now form part of one or more alliances. In the 1990s, many regional-type alliances arose to cover specific routes linking ports in one or two continents, but the most spectacular development has undoubtedly been the creation of the four great global alliances formed by the world's largest shipping companies and multimodal transport operators.[6]

The key feature of global alliances is their geographical reach. They are multi-continental and cover all the main axes of international maritime transport. In their founding agreements, they seek to go beyond the initial premise which is at the basis of any strategic shipping alliance, the sharing of space on vessels. In a gradual process of integration, the global alliances are seeking to share feeder services and make joint use of terminals, both in ports and inland. They are also seeking to conclude agreements under which the land sections of distribution networks will be operated jointly, i.e., they are trying to control the whole network by consolidating intermodalism.

Among international shipping users, there is concern about the consequences of the ever-increasing tendency towards concentration of services, as now reflected in the proliferation of alliances and mergers. The creation of powerful actors with monopolistic or oligopolistic power is unquestionably a concern for exporters and importers. Analysis of trends in sea container transportation rates for the main international shipping lanes has shown, however, that over the last seven years these rates have shown a tendency towards negative growth on average, i.e., a tendency to decline; consequently, it would seem that competition is still strong and no actors have appeared with enough power to have a significant effect on the market (Martner and Moreno, 2001).

[5] It is sufficient to mention as an example the order placed with Samsung Heavy Industries in January 2001 by China Shipping Container Line (CSCL) for two ships with a capacity of 10,000 TEU apiece, which are due to go into operation in 2004. In recent years, CSCL has become the second largest shipping company in the People's Republic of China; only COSCO is larger.

[6] The four global alliances are: i) the **Grand Alliance**, formed by P&O Nedlloyd, Hapag-Lloyd, Nippon Yusen Kaisha (NYK), Orient Overseas Container Line (OOCL) and Malaysia International Shipping Corporation (MISC); ii) the **Unique Global Alliance**, formed by Maersk Line and Sea Land, recently merged into Maersk-Sealand; iii) the **New World Alliance**, including American President Line (APL-NOL), Mitsui-OSK Lines (MOL) and Hyundai Merchant Marine, and iv) the **United Alliance**, involving Hanjin, DSR-Senator and Cho Yang.

It is still not clear how far shipping concentration will go, nor how many companies will survive the competition. Nonetheless, the tendencies alluded to are having a substantial effect on the structure and characteristics of ports around the world.

3. Towards a global port network

The appearance of large hub ports was made possible by the increase in ship size and the creation of large consortia and/or alliances among shipping operators. To concentrate cargo in a main port node, however, it is necessary to redefine the functions of a number of intermediate ports while at the same time developing an interconnected, hierarchical structure of smaller ports to feed cargo to the hubs. Only then can megaships and megaports be viable. When this is understood, the idea of a global network of ports becomes conceptually clear. The implication is that many ports will be excluded from mainline services and, at best, will be able to participate in the network only by servicing feeder routes along which cargo is carried on smaller ships to some main port node (hub port), there to be transferred to large ships for onward carriage to the final destination.

According to this conceptual approach, "global hubs" are at the top of this global port network by virtue of the size of their terminals and flows, the type of ships operated and their geographical coverage, involving multi-continental links. These global hubs are generally situated in the northern hemisphere, on east-west routes, which is where the main shipping lanes and networks are.

Global hubs, defined as logistical centres for the concentration, processing, consolidation and distribution of goods and information, are fed by flows from both land networks and maritime feeder networks. The development of intermodalism has undoubtedly been essential for the concentration of cargo in ports, inasmuch as it extends inland connections and expands the port hinterland to more distant regions.

In emerging and historically non-central places, within the globalized capitalist economy whose trade flows have recently grown strongly, the global port network has required an intermediate link between the great global hub and feeder ports. Consequently, a new tendency in the formation of this global network has been the creation of "regional hubs" whose size, cargo capacity and geographical coverage are less than those of the global hubs (table 1) but more than those of feeder

TABLE 1

World: Main global and regional hub ports, by geographical region, 1999

Global hubs			Regional hubs		
Asia		Millions of TEU	Asia		Millions of TEU
Hong Kong	(China)	16.1	Port Klang	(Malaysia)	2.5
Singapore	(Singapore)	15.9	Tanjung Priok	(Indonesia)	2.3
Kaohsiung	(Taiwan)	7.0	Manila	(Philippines)	2.1
Busan	(Rep. of Korea)	6.4	Laem Chabang	(Thailand)	1.8
Shanghai	(China)	4.2	Colombo	(Sri Lanka)	1.7
Tokyo	(Japan)	2.7	Yantian	(China)	1.6
Europe		Millions of TEU	Europe		Millions of TEU
Rotterdam	(Netherlands)	6.4	Gioia Tauro	(Italy)	2.3
Hamburg	(Germany)	3.8	Algeciras	(Spain)	2.0
Antwerp	(Belgium)	3.6	Marsaxlokk	(Malta)	1.0
Felixstowe	(United Kingdom)	2.7	Piraeus	(Greece)	1.0
			La Spezia	(Italy)	0.8
North America		Millions of TEU	The Caribbean		Millions of TEU
Long Beach	(United States)	4.4	Manzanillo	(Panama)	1.0
Los Angeles	(United States)	3.8	Kingston	(Jamaica)	0.7
New York	(United States)	2.9	Freeport	(Bahamas)	0.5
Middle East		Millions of TEU	Middle East		Millions of TEU
Dubai	(United Arab Emirates)	2.8	Damietta	(Egypt)	1.2

Source: Prepared by the author on the basis of data from *Containerisation International*.

ports. Most regional hubs are on the intersection of east-west and north-south routes.

In Latin America, one example of a regional hub is the international terminal of Manzanillo, in Panama. This port, which was inaugurated in 1995, receives medium-sized container vessels (2,000 to 4,000 TEU) from the trans-Pacific and trans-Atlantic corridors and links up container cargo flows using smaller ships (500 to 1,500 TEU) from the Caribbean Basin and South America. Thus, the main activity of Manzanillo-Panama is trans-shipment and maritime interconnection with the regions of the American continent referred to.

All of a piece with the formation of the global port network is the burgeoning of trans-shipment. The segmentation of routes, and thence the proliferation of feeder services among the different hierarchical levels of the port network, is an indispensable precondition if cargo is to be concentrated at hubs and larger and larger ships are to be filled. Thus, trans-shipment becomes the "glue", the unifying element, in maritime transport chains. In other words, the aim is to use trans-shipment to integrate into the global port network a number of smaller hubs (regional hubs) and feeder ports that, by allowing low-volume mainline routes to be replaced by feeder routes, can supply cargo and feed the great global hubs.

There are now ports that survive almost entirely on trans-shipment. Many regional hubs, situated at key geographical points where routes intersect, are of this nature. A very thorough analysis is needed, however, to ascertain the potential of each place, and how best it can be fitted in to global goods transport and physical distribution networks. The economic, geographical, technological and logistical characteristics of the region or country where it is intended that the hub should be established also need to be considered in the light of key tendencies in the organization of international maritime and intermodal transportation.

The main concern of this paper is to establish the viability of Mexican ports in the light of the new trends in international maritime transport, and to ascertain their potential to become hubs, whether as trans-shipment ports or as intermodal links with inland regions.

III

Mexican ports in the global context

In Mexico, the port restructuring and privatization of the 1990s produced substantial improvements in infrastructure, equipment and goods loading and unloading operations. New investment accompanied the appearance of private port operators and the rearrangement of liner services. Restructuring, in fact, has been creating a new port geography, and in some cases giving rise to forms of regional and global integration that were unknown in previous periods.

The aim of this section is to establish five important areas of analysis and suggest possible indicators that can assist in determining the potential and limitations of Mexican ports in a context dominated by the creation of a global network of hub ports. The model proposed includes not only typical port development indicators, such as the rate of growth in cargo flows and shipping services, but also some new ones related to the geography of transport and the sea-land linkages of ports. For this reason, stress is laid here on the role of a port's inland connection as a source of cargo, and as a result the issue of modal integration takes on particular importance. Analyses of the position of ports in relation to the main international maritime trade corridors, and of the combination of mainline and feeder services, are also included. Both these aspects are of the greatest importance in determining the global potential of the country's ports.

1. Evolution and dynamism of container cargo in Mexican ports

During the 1980s, container handling on the Mexican Pacific coast was still more or less evenly shared out among at least four ports. In 1988, Pacific containers were divided among Guaymas (21.6%), Manzanillo (27%), Lázaro Cárdenas (28%) and Salina Cruz (18.5%). These ports served their traditional captive hinterlands: Guaymas covered the cities of the north-west, Manzanillo and Lázaro Cárdenas served the Bajío area and the centre of the country, and Salina Cruz served the south and south-east.

A similar situation was seen in the Gulf of Mexico, albeit with differences of scale. Here too, most ports had few links and only limited territorial integration

TABLE 2

Mexican ports: Container cargo, by coast, 1988-2000
(*Percentage shares and average annual growth rates*)

Pacific	1988 %	2000 %	AAGR[a] %	Gulf of Mexico	1988 %	2000 %	AAGR %
Ensenada	0	5.7	–	Altamira	14.0	21.8	20.7
Guaymas	21.6	0	–	Tampico	19.6	5.9	5.3
Mazatlán	2.5	3.6	19.4	Tuxpan	17.3	0	–
Manzanillo	27.0	89.3	27.8	Veracruz	44.4	64.4	20.0
L. Cárdenas	28.0	0.2	-24.7	Coatzacoalcos	4.1	0	–
Acapulco	2.2	0	–	Puerto Progreso	0.4	7.1	48.8
Salina Cruz	18.5	1.2	-8.2	Others	0.2	0.8	–
Others	0.2	0	–				
Total	*100.0*	*100.0*	*15.7*	*Total*	*100.0*	*100.0*	*16.4*
Movement in 1988 = 81,328 TEU[b]				Movement in 1988 = 135,714 TEU			
Movement in 1999 = 469,808 TEU				Movement in 1999 = 838,523 TEU			

Source: Prepared by the author on the basis of data from the Coordinación General de Puertos y Marina Mercante.

[a] AAGR = Average annual growth rate (%).
[b] TEU: Twenty-foot equivalent unit.

with inland areas. The rough balance of flows seen on the Pacific seaboard was not so much in evidence here, however, owing to the existence of established ports and cities that had traditionally been important in the country, such as Veracruz and Tampico, whose relationship with Europe and the American Atlantic goes back to colonial times.

Despite the traditional dominance of Veracruz, in the late 1980s container flows were still diversified, being spread around at least five ports on the Gulf of Mexico (table 2). In the north-east, Altamira and Tampico had shares of 14% and 19.6%, respectively. Tuxpan and Veracruz handled traffic with the central and southern areas of the country, and their container shares were 17.3% and 44.4%, respectively. Coatzacoalcos, meanwhile, moved the containers of companies in the south-east and the Yucatan peninsula.

This delicate near-balance of cargo flows, however, could not long withstand the conditions and demands of a highly competitive maritime and port environment, where technological and organizational change, as manifested chiefly in the advent of huge vessels, great terminals and hub ports, and in the birth of global alliances and megacarriers in the business of maritime and multimodal transportation, resulted in a strong tendency towards concentration and specialization.

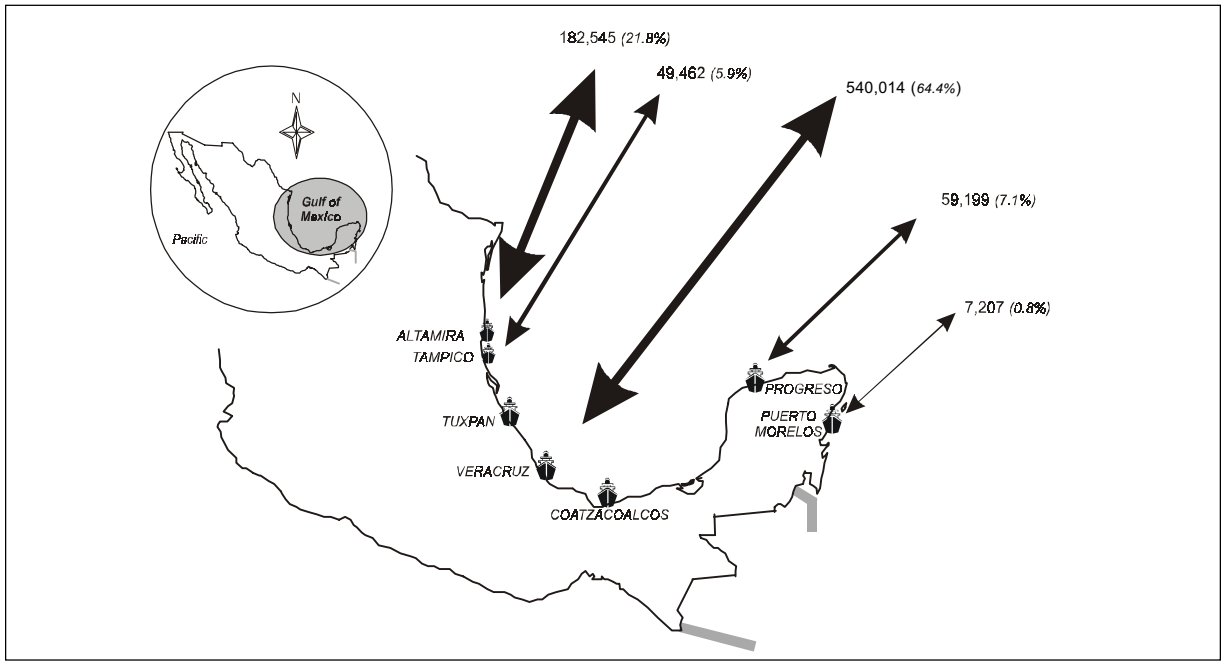
During the 1990s, these global tendencies, along with increasing trade liberalization and the port restructuring carried out in Mexico, gave rise to a substantial change both in the evolution of container cargo flows and in the country's port geography. The first aspect that needs to be highlighted is the rapid growth in general container cargo along both seaboards. Between 1988 and 2000, container movements along the Mexican Gulf and Caribbean seaboard grew at an average annual rate of 16.4%. On the Pacific seaboard, the average annual growth rate was 15.7% (table 2).

The second aspect is the reorganization of flows and the new port hierarchy. In 2000, container flows on the Mexican Gulf and Caribbean seaboard were largely accounted for by just two ports, Veracruz and Altamira (map 1). The former moved 64.4% of all containers (measured in TEU) and the latter 21.8%. Between them, they accounted for 86.2% of this type of cargo on the Gulf seaboard. With the exception of Puerto Progreso in Yucatan, the remaining ports on this coast have stagnated and seen their importance as nodes in regional development and production chains diminish. In fact, Tuxpan and Coatzacoalcos have dropped out of container movements, and their flows have been absorbed by Veracruz. Tampico, meanwhile, has lost share to Altamira.

On the Mexican Pacific coast, shifts in flows have led to even more pronounced concentration in container movements. In 2000, a single port attracted 89.3% of all the seaboard's containers (map 2). This was the port of Manzanillo, situated on the coast of the state of Colima. The other ports that had a significant share of

MAP 1

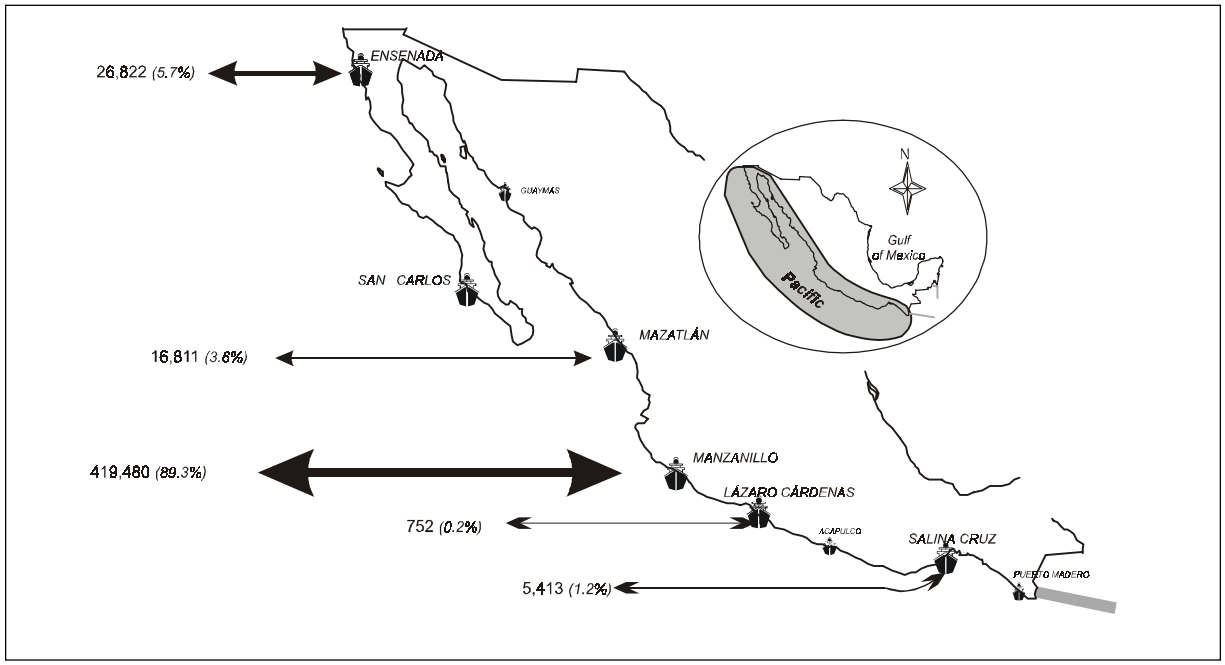
Gulf of Mexico ports: Movement of container cargo, 2000
(TEU)



Source: Prepared by the author on the basis of information from the Dirección General de Puertos y Marina Mercante.

MAP 2

Mexican Pacific ports: Movement of container cargo, 2000
(TEU)



Source: Prepared by the author on the basis of information from the Dirección General de Puertos y Marina Mercante.

this cargo category during the 1980s have suffered a slump: liner vessels have stopped calling there and have concentrated their operations in Manzanillo.

Thus, Guaymas stopped moving containers in the 1990s, Lázaro Cárdenas and Salina Cruz saw a sharp drop, and only Mazatlán managed to increase its share, although this is still only a small proportion of the total. A newcomer to container movements is the port of Ensenada, in Baja California; its share is modest, although it may be able to grow at a good rate if it can handle inputs on a large scale for *maquila* companies in Tijuana, Mexicali and Ensenada itself.

The traditional indicator for measuring the evolution of cargo has been the average annual growth rate. This can be analysed and compared over set periods of time chosen to encompass important socio-economic events.[7] Clearly, it will not by itself shed enough light on the position of ports in the global network. It will, however, provide clues of some importance for subsequent analysis. To begin with, on the Pacific seaboard there are two small ports (Ensenada and Mazatlán) situated on the bottom rungs of the global network (as feeders) and one port that is growing to intermediate size and has the potential to occupy a higher position in the international port hierarchy. This is Manzanillo, whose average annual growth rate in container movements was an impressive 27.8% in the period 1988-2000, the highest in the country.

Similarly, on the Gulf-Caribbean seaboard there are two dynamic hub ports that are tending towards an intermediate size in the international system. These are Veracruz and Altamira, which grew by an annual average of over 20% between 1988 and 2000. Also striking is the dynamism shown by a small port, Puerto Progreso, in the flow of container cargo based on short-range regional and international links. Since these data do not explain how the country's ports become cargo hubs, however, or how they might take on greater international importance, additional elements of geoeconomic analysis need to be brought in.

2. Where ports obtain their cargo

Traditionally, ports obtained all their cargo from the regions adjoining them. In other words, goods flows were mainly attracted or generated by areas and urban centres close to the port. The inefficiency of port operations, regulatory barriers and the difficulty of land access meant that a port's hinterland was strictly limited by geographical proximity. Thus, experts on port issues (UNCTAD, 1992) used to say that Latin American ports had a captive hinterland, since these constraints on access and operations represented very costly barriers for any port seeking to compete for a market situated within another port's well-defined hinterland.

But as intermodalism developed and legal, administrative and operational obstacles were overcome, the geographical area within which ports could attract or generate cargo expanded considerably. Similarly, captive zones of territorial influence broke up and gave way to a shared hinterland that could be fought over and shared by a number of ports simultaneously, as and when the integration of the different forms of transport made this possible. For example, ports on the Pacific and Atlantic coasts of the United States have greatly expanded their hinterland owing to the development of intermodal transport systems. Now they are even competing for the traditional hinterlands of Mexican and Canadian ports. Thus, one of the main ways for a port to concentrate cargo and become a regional or global hub is now to expand its hinterland through multimodal integration.

Another way of concentrating cargo from distant places is to develop maritime trans-shipment. As was noted in previous sections, a growing number of ports around the world have become trans-shipment hubs, and some even survive almost exclusively on this activity, which is so characteristic of the recently formed global port network system. Important examples can be found on virtually every continent: Singapore in Asia, Algeciras and Gioia Tauro in Europe, Manzanillo-Panama in America and Damietta in North Africa, among others.

To ascertain the potential of Mexican ports and the likelihood of their being able to participate and improve their position in the global port network, it is necessary, in each individual case, to analyse the geographical area from which they obtain their cargo.[8] Those whose geographical area of influence continues to be their traditional hinterland are unlikely to rise in the global network. By contrast, those that extend their zone of geographical influence and/or introduce trans-shipment activities will be able to concentrate cargo and position themselves more firmly in the network.

[7] In this case, the major events marking out time periods are chiefly trade liberalization and port restructuring.

[8] A Paretian arrangement for analysing comparative developments in the primary hinterland, accounting for 80% of the cargo handled by the port by volume and/or value, and the secondary hinterland, accounting for the remaining 20%, could be a useful and easily applied numerical indicator for port administrators.

The first thing that needs to be said is that most national ports obtain their cargo from their traditional hinterland, consisting of the state to which they belong (or the province or department, in other countries) and neighbouring states. Geographical proximity and continuity continue to play a preponderant role, and the opportunities for concentrating cargo are fewer.

A smaller number of ports obtain cargo from an extended hinterland consisting of a number of states in which physical proximity is not so important. The structure is one of diversified multiregional linkage which offers the potential for the port to concentrate large volumes of cargo. Prominent in this group are the ports of Manzanillo, on the Pacific coast, and Veracruz and Altamira, on the Gulf of Mexico.

The concentration of specialist cargo agents, multimodal transport operators and logistical services for just-in-time management of manufactured inputs, and the development of land transport corridors and, in the best case, a land bridge with double-stack container trains connected to inland intermodal terminals, have all contributed in recent years to the expansion and diversification of these three ports' hinterland.

3. Modal integration of Mexican ports

The development of intermodalism is essential if cargo is to be concentrated and the competitive position of Mexican ports strengthened, particularly when most cargo is generated or attracted by inland cities and regions. However, the land-sea interconnection still has problems with modal integration and with coordination of the different activities associated with the physical distribution of goods internationally.

Previous studies by the Mexican Institute of Transport (IMT, 1997, 1998, 1999 and 2000) have alluded to the problem created by the intrusiveness of the goods inspection system, to the detriment of fluidity in external trade chains. Better coordination and cooperation among the institutions involved in this would undoubtedly help reduce the amount of time for which goods are tied up in port terminals, but there is also a need for land transport options to be restructured, both by streamlining operations and by introducing logistical distribution strategies and modernizing technology.

Application of the so-called national transport evaluation indicators proposed by the Mexican Institute of Transport (IMT, 2001b) would make it much easier to carry out detailed analysis of the country's land-sea interconnection problems. Indicators such as the waiting rate, the vehicle attention rate, container turnaround time, the intermodal service utilization rate and the supply capacity of the intermodal railway service,[9] among others, will furnish data that can be used to refine the study of modal integration in each port.

To begin with, a significant indicator for the land-sea interconnection is the long average turnaround time for containers in Mexican port terminals. This is virtually double the international benchmark,[10] and unless a substantial reduction is achieved in the medium term, it will limit the scope for concentrating larger volumes of cargo and using ports to develop just-in-time chains. Double-stack container train services are another important element. Suffice to say that the two major hub ports on the Gulf seaboard (Veracruz and Altamira) handle large enough volumes of container cargo to compete with United States Gulf ports by using this technology, which doubles the number of containers moved by one train and produces substantial savings in total transport chain costs.

At present, the only Mexican port that has consolidated the double-stack train service is Manzanillo, and penetration has been growing. During 2000, some 40% of all containers moved went by railway. Thus, this port has an extra competitive advantage that in the long run will enable it to move up through the global network.

A striking fact that emerges in this analysis is that Mexican ports do not obtain maritime trans-shipment cargo. Trans-shipment percentages are insignificant, if not non-existent; ports, then, are only supplied by land. The fact is that current legislation, far from encouraging trans-shipment activity, constrains it. The Reglamento de la Ley de Navegación (Mexico, Federal Government, 1998), or navigation act, states that foreign ocean-going vessels may only carry empty containers among

[9] The national transport evaluation indicators proposed by the Mexican Institute of Transport (IMT, 2001b) assume simple operations and data that administrators and transport regulators can easily obtain. For example, the waiting rate is WR = Wt/Bt, where Wt = waiting time to berth or enter the loading and unloading area and Bt = time berthed at a quay or in inner terminal loading and unloading areas. The vehicle attention rate is VAR = Aot/Bt, where Aot = actual operating time and Bt = time berthed at a quay or in inner terminal loading and unloading areas. The turnaround time indicator is TI = time/containers.

[10] In Mexico, the turnaround indicator averages 10 days, as against an international benchmark of five days and a United States benchmark of seven days.

Mexican ports, for the purpose of using this equipment for goods exports (article 71). This means that ocean-going liner shipping companies cannot carry out trans-shipment of full containers between the country's ports.

In addition, article 72 of this law prohibits coasting vessels from trans-shipping people or goods on to ocean-going vessels. Opportunities for trans-shipment are limited, therefore, to full or empty containers coming from other countries, and empty containers in the case of ocean-going liners calling in at more than one Mexican port.

Thus, legal restrictions mean that this dynamic option for obtaining cargo in the era of the global port network cannot be fully exploited for cargo concentration purposes. This is not the only factor involved, however. Another important reason for the absence of trans-shipment is undoubtedly the location of Mexico's coastlines in relation to the main international shipping lanes.

4. The location of ports in relation to the main ocean corridors

The analysis carried out in previous sections shows that ports' geographical location in relation to the main shipping lanes largely determines the scope for creating regional or global hubs within the network. For example, Hoffmann (2000) clearly shows the difficulties involved in establishing hub ports on the South American Pacific seaboard, owing among other reasons to its distance from the main international shipping lanes.

Global hubs are invariably located on east-west routes in the northern hemisphere. This is directly related to the fact that the most important and heavily used international trade corridors are there, namely the connections among Europe, North-East Asia and North America. Regional hubs, on the other hand, tend to develop most easily in areas where the main east-west corridors cross or connect with north-south routes. In the American continent, the main areas where this is the case are the Caribbean and Panama. Hoffmann (2000) notes the impressive increase in trans-shipment in some of this region's ports, such as Manzanillo-Panama, Kingston in Jamaica and Freeport in the Bahamas. The reason for this is to be found in the proliferation of feeder services on less heavily used routes, and the concomitant need for trans-shipment in places where routes cross. It is in the Caribbean that the north-south routes of the American continent cross the international shipping lanes linking North America, Asia and Europe. On the continent's Pacific coast there is another point where routes cross: the ports of Long Beach and Los Angeles in California, where smaller ships from the South American Pacific meet larger vessels on the North America-Asia axis.

It needs to be asked what the position of Mexican ports is in this geographical context. Given their geographical location, is it possible to create regional or global hubs on Mexico's coasts? On the face of it, they do not seem to be very far away from where routes cross or intersect. Principally, the Mexican Pacific is situated on the axis of intersection constituted by Long Beach/Los Angeles in California and the trans-shipment ports of the Panama Canal. By contrast, on the axis of intersection constituted by the Atlantic coast of Panama, Mexico's Gulf ports are relatively distant from the area where north-south routes and east-west routes intersect, by comparison with Florida and the island countries of the Caribbean (map 3).

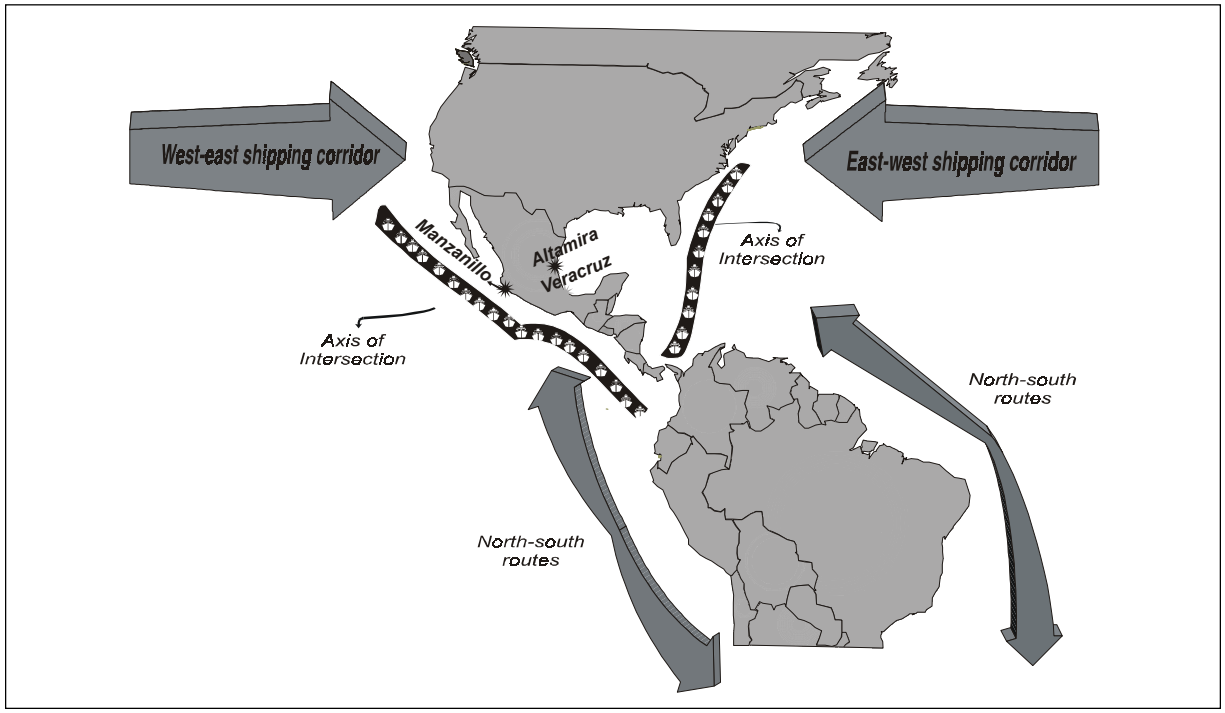
Thus, by concentrating ever-increasing flows of container cargo generated or attracted by numerous producer and consumer regions in the country, a Mexican Pacific port such as Manzanillo, which is on the axis of intersection referred to earlier and which has substantially expanded its domestic hinterland, could increase the number of containers moved exponentially by carrying out connection and trans-shipment functions between the north-south and east-west routes. In other words, it would be in a position to rise in the hierarchy of the global port network until it became a regional hub obtaining cargo not just from its extended hinterland, but also from maritime interconnection and trans-shipment operations.

A study by Zohil and Prijon, cited by Hoffmann (2000), analysed the relationship between the volume of port traffic generated by a port's hinterland, the geographical location of the port concerned and the volume of trans-shipment traffic for the Mediterranean Sea. The authors "conclude that the volumes of trans-shipment traffic of a port are a linear function of the volume of port traffic [generated by the hinterland] and an inverse linear function of the distance from the main line [route] of transit. In other words, ships tend to prefer ports for which they have local cargo and take advantage of their presence there to engage in trans-shipment operations. The shorter the detour from the main route that the stopover involves, the more likely that port is to be chosen as a trans-shipment centre…" (Hoffmann, 2000, p. 129).

The port of Manzanillo meets these criteria to a great degree. It obtains cargo from its hinterland and is

MAP 3

Mexican ports in relation to interoceanic shipping axes



Source: Prepared by the author, February 2001.

virtually on top of an intersection between mainline and feeder routes. Thus the comparative advantages, especially the geographical ones, are there. What is needed now is for this potential to be realized by the actions and vision of the public- and private-sector actors associated with the port in question. A strategic vision and the planning of development to anticipate events are essential if this potential is to be taken advantage of. In this case, planning objectives have to be set so that the port can improve its position in the face of strong competition from other ports in North and Central America looking to act as hubs.

The main node of competition is undoubtedly represented by the United States ports in the south of California. Long Beach and Los Angeles continue to overcome technical constraints to reclaim land from the sea and develop container megaterminals.[11] The two ports will retain their role as a global hub for a long time to come. In recent years, however, Manzanillo has expanded its hinterland to take in Mexican cargo markets in the north and centre of the country that were being served by Long Beach and Los Angeles. It has also managed to increase the number of trans-shipments on the routes linking the South American Pacific with Asia, although in this category the main competition is provided by the ports of the Panama Canal.

The strength of the Gulf of Mexico ports as regards their potential for rising within the global port network lies principally in the opportunities for expanding their hinterland. In this case, it would seem that only the first criterion of Zohil and Prijon (cited in Hoffmann, 2000) is met, while the second one is not, since the main east-west shipping lanes do not enter the Gulf (map 3). In other words, their greater distance from the axis where the main routes intersect makes it much less likely that shippers will wish to carry out trans-shipment activities in the Mexican Gulf ports. Thus, the potential of Veracruz and Altamira basically lies in the scope for expanding their hinterland and capturing larger container flows from and to the country's interior. Both

[11] In 1997, the shipping company American President Line (APL) inaugurated Global Gateway South, the largest container terminal in the United States (265 acres), in the port of Los Angeles. Four years later, in 2001, Maersk-Sealand began construction in the same port of the largest container megaterminal in North America. At 484 acres, it is almost twice as large as the preceding one.

these ports can aspire to become national cargo hubs if they strengthen their intermodal connections.

5. Direct and indirect liner services[12] in Mexican ports

This is a new element, but it is essential in determining the situation of ports in the global network. It is fairly clear that a port catering to small ships and offering indirect routes between places of origin and destination will be near the bottom of the network hierarchy, as a feeder port. The position is not so clear when feeder routes coexist with mainline routes. It would be necessary to analyse the characteristics of the latter in particular. The outcome is very different depending on whether the routes concerned are traditional mainline ones directly linking ports a long way apart using relatively small vessels with high costs per unit of cargo moved, or whether these mainline routes are plied by large or medium-sized vessels along the main international shipping lanes.

In Mexico, most ports that move containers have few liner services, arrivals are infrequent, and most vessels are small ones working short routes that feed larger ports abroad, whence the cargo is redistributed by sea or land to the final destination. Within this group of small ports, some are expanding and have been introducing new services on more important routes, such as Ensenada on the Pacific and Puerto Progreso on the Gulf of Mexico. Others have remained fairly stable as regards volumes and services offered, examples being Mazatlán, Tampico and Puerto Morelos. Lastly, there are ports that are clearly losing ground and tending to be left outside the global network, such as Lázaro Cárdenas and Salina Cruz on the Pacific coast and Coatzacoalcos and Tuxpan on the Gulf coast.

The three ports that dominate the country's container movements are in a different situation. During the 1990s, the ports of Manzanillo, Altamira and Veracruz not only concentrated larger flows of container cargo, but also attracted a large number of liner shipping companies (table 3).

Without escaping from global trends, these actors have formed strategic alliances to offer particular services and serve routes jointly. The result is that larger and larger vessels are docking in them, and with increasing frequency. In addition, feeder services are being combined with mainline routes on the great international east-west shipping lanes.

To gain a more nuanced understanding of the differences and particular potential of each of the three ports concerned, a more detailed analysis of the characteristics of these mainline services is required. Firstly, it should be noted that the mainline services of Veracruz and Altamira are part of the North America-Europe shipping axis or corridor. The three services that are most important in terms of frequency, ship size and speed of turnover take in the two Gulf ports in the same order. That is, they always call in first at Veracruz and then at Altamira. This is obviously not down to chance; the logic of this order is dictated by the direction of flows and the characteristics of each port's hinterland. In Veracruz, imports going to the country's largest consumer region, namely the metropolitan area of Mexico City and the states of the central zone, are what predominate. Intermediate goods also come in for companies working with lean inventories and the just-in-time supply system, mainly in the automotive and electronics industries. This is why Veracruz is the first port of call on routes from Europe.

In Altamira, by contrast, it is export flows that predominate. The port caters to areas that are primarily producers of manufactured goods, such as the state of Nuevo León and the Tampico-Altamira industrial corridor itself, in the state of Tamaulipas. For this reason, it is logical to expect Altamira to become the port of departure for routes to Europe.

Two of the three direct routes go to ports in northern Europe, of which the main ones include Antwerp, Bremerhaven and Le Havre (table 4). Strategic alliances among shipping companies have resulted in larger flows on the northern Europe route, as a result of which they have improved the service by introducing larger, faster ships. The third route is towards Mediterranean ports such as Valencia and Barcelona in Spain and La Spezia and Gioia Tauro in Italy. This latter route operates at a lower frequency, although plans were recently announced to strengthen it by bringing in larger ships with a greater frequency of arrival.

In addition, Veracruz has another direct service to Europe that takes in Tampico instead of Altamira. This is a lower frequency route, operated with small ships, that includes some Caribbean ports in its itinerary. By

[12] With mainline services, the cargo is not trans-shipped at any stage during its sea crossing. Feeder services, by contrast, necessarily entail trans-shipment of cargo at some intermediate port. Between Mexico and Asia, for example, there are mainline services in medium-sized container ships (2,000 to 4,000 TEU) and feeder services in small ships (500 to 1,000 TEU) that trans-ship cargo in the Pacific United States ports to larger vessels which then carry it on to the Asian continent.

TABLE 3

Port of Manzanillo, Mexico: Presence of liner shipping companies, 1985-2000

Shipping company	1985	1990	1995	1997	2000
TMM (now TMM Lines)	√	√	√	√	√
Ned Lloyd	√	√	√	√	
Delta Steamship Line	√				
K Line	√	√	√	√	√
Nippon Yusen Kaisha	√	√	√	√	√
F.M. Grancolombiana	√	√	√	√	√
Mitsui O.S.K. Line		√	√	√	√
Cía. Sudamericana de Vapores		√	√	√	√
Lauritzen		√	√	√	√
American President Line			√	√	√
Sea Land			√	√	√
Maersk Line			√	√	√
Australian New Zealand Line			√	√	√
Maruba Line				√	√
Pacific Star Line (COSCO)				√	√
Cía. Chilena de Navegación Interoceánica				√	√
Lykes Line					√
Hanjin Shipping Line					√
DRS Senator					√
Cho Yang					√
P&O Nedlloyd					√
Colombus Line					√
Toka Kaiun Kaisha					√
Total shipping companies	*6*	*8*	*12*	*15*	*21*

Source: Prepared by the author on the basis of data from the Coordinación General de Puertos y Marina Mercante and the Manzanillo Port Administration.

TABLE 4

Gulf of Mexico ports: Mainline container routes

Shipping company or alliance	Route	Frequency	Ships (in TEU)
Hapag-Lloyd/TMM/Lykes/ Evergreen/CMA-CGM	***Veracruz*** - ***Altamira*** - Charleston - Antwerp - Thamesport - Bremerhaven - Le Havre - Houston - Veracruz	Weekly on set day	2,800 to 2,400
Mediterranean Shipping Co.	***Veracruz*** - ***Altamira*** - Houston - Nola - Miami - Freeport - Charleston - Antwerp - Hamburg - Bremerhaven - Felixstowe - Le Havre	Weekly on set day	2,700
TMM/Lykes/Contships	***Veracruz*** - ***Altamira*** - Houston - New Orleans - Valencia - Barcelona - Gioia Tauro - La Spezia - Miami - Veracruz	Every nine days	2,400 to 2,100
Melbridge C.L./H. Stinnes	***Veracruz*** - ***Tampico*** - La Guaira - Pto. Cabello - Río Haina - San Juan - Antwerp - Hamburg - Bilbao - San Juan - Río Haina - Veracruz	Once a fortnight	1,100

Source: Prepared by the author, 2001.

TABLE 5

Mexican Pacific ports: Mainline container routes

Shipping company or alliance	Route	Frequency	Ships (in TEU)
Maersk-Sealand	Hong Kong - Kaohsiung - Kobe - Nagoya - Yokohama - Oakland - Long Beach - ***Manzanillo (Mexico)*** - Balboa - Manzanillo (Panama) - Miami - Charleston - Newark - Halifax	Weekly on set day	4,300
TMM/Lykes Lines/APL	***Manzanillo (Mexico)*** - Yokohama - Kobe - Hong Kong - Kaohsiung - Pusan - Kobe - Yokohama - Los Angeles - ***Ensenada (Mexico) - Manzanillo (Mexico)***	Weekly on set day	3,266
Hanjin/Cho Yang/DRS-Senator	Yantian - Hong Kong - Kaohsiung - Pusan - ***Manzanillo (Mexico)*** - Manzanillo (Panama) - Savannah - Norfolk - New York - Felixstowe - Bremerhaven - Rotterdam - Le Havre - New York - Norfolk - Manzanillo (Panama) - ***Manzanillo (Mexico)*** - Long Beach - Pusan - Yantian	Weekly on set day	2,700
CSVA/NYK	Yokohama - Nagoya - Kobe - Pusan - Keelung - Hong Kong - Los Angeles - ***Manzanillo (Mexico)*** - Guayaquil - Callao - Iquique - San Antonio - Antofagasta - Callao - ***Manzanillo (Mexico)*** - Yokohama	Weekly on set day	2,226 to 1,726
P&O Nedlloyd	Singapore - Hong Kong - Keelung - Pusan - Kobe - Yokohama - ***Manzanillo (Mexico)*** - Buenaventura - Callao - Iquique - Valparaíso	Once a fortnight	2,169
TMM/Lykes Lines/Maruba	Kaohsiung - Hong Kong - Shanghai - Pusan - Los Angeles - ***Manzanillo (Mexico)*** - Puerto Quetzal - Puerto Caldera - Callao - Iquique - San Antonio	Once a fortnight	1,730 to 1,493

Source: Prepared by the author, 2001.

its structure and itinerary it seems to work more as a traditional-style mainline route, with stops at certain ports without specialist terminals where general loose cargo handling is combined with container cargo handling.

Feeder routes in Veracruz and Altamira are very numerous. The most extensive ones link the east coast of the United States with the east coast of South America, with ships calling in at the Mexican Gulf coast ports. This service is provided by strategic alliances among Brazilian, European and North American shipping companies operating vessels with a capacity of roughly 1,500 TEU. Such services are regarded as feeder ones here because they have onward connections to Europe, Asia and Africa at the trans-shipment hubs of the east coast of the United States and some hubs in the Caribbean. There is also a set of short-distance routes running between the Gulf of Mexico, Central America and the Caribbean Basin. Vessels with a capacity of between 600 and 1,100 TEU operating services of this type are constantly arriving in Veracruz and Tampico.

On the Pacific coast, mainline and feeder liner routes are much more concentrated on a single port. Manzanillo is the main magnet for both types of route. But that is not the only difference between it and the Gulf ports. Mainline services there, connecting mainly with the North America-Asia corridor, are more numerous and operate with larger vessels (table 5).

In addition, two of the routes with direct services form part of global alliances of international shippers. Not only do they connect Manzanillo with the main trans-Pacific axis (i.e., with the North America-Asia corridor), but they also connect it with the main trans-Atlantic axis, the North America-Europe corridor. Thus, the United Alliance service (Hanjin Shipping, Cho Yang and DRS-Senator) starts in Asia, calls in once a week at Manzanillo and carries on through the Panama Canal to the east coast of the United States and then Europe.

In late 2000 a route operated by what was then a global alliance, but is now a merged company named Maersk-Sealand, was introduced to Manzanillo. This service also links Asia with the Pacific and Atlantic coasts of North America, and it uses the largest

container ships ever to dock in a Mexican port (4,300 TEU capacity).

In addition, three long-distance mainline routes running from the South American Pacific to the Far East and back have been introduced. The most frequent one is that operated by the strategic alliance between the Compañía Sudamericana de Vapores (CSVA), of Chilean origin, and Nippon Yusen Kaisha (NYK), of Japanese origin. This service operates with medium-sized vessels (1,700 to 2,200 TEU) that dock in Manzanillo once a week. The other two services running from South America to Asia are less frequent. Ships operated by P&O Nedlloyd, with a capacity of over 2,150 TEU, and by the strategic alliance formed by TMM, Lykes Line and Maruba, with a maximum capacity of 1,730 TEU, dock in Manzanillo once a fortnight.

Feeder services have also grown. Short feeder routes between the Central American Pacific and the North American Pacific, and north-south routes between South America and ports on the east coast of the United States, have a greater presence in Manzanillo. Shipping companies such as the Compañía Chilena de Navegación Interoceánica (CCNI), TMM, Lykes Line, Maruba and Pacific Star Line, among others, operate these routes using small vessels of 1,000 TEU or less.

To sum up, the presence of high-capacity vessels operated by two of the four global alliances of international shippers, the link both with the trans-Pacific corridor and with the trans-Atlantic one and the development of new feeder services show that Manzanillo is "astride" the axis where east-west and north-south routes intercept and connect with one another. Consequently, it could develop container cargo concentration not only through growth in the flows from its hinterland but also through greater participation in international maritime trans-shipment.

IV

Prospects and preliminary conclusions

The concentration of container cargo at specific points along the Mexican coast is a firm tendency that will continue over the coming years. Economies of scale can only be obtained and a market with a wide range of specialist logistical services created if cargo is accumulated at hub ports. Consequently, if port terminals become saturated (as is the case with Veracruz), it would be highly advisable for extra capacity to be created in the reserve areas of the ports themselves or somewhere nearby. If new ports are created elsewhere, flows will be dispersed and the advantages of agglomeration will be lost.

Most of the country's ports will have feeder functions within the global port network. Some feeders are in a state of obvious decline, however (Lázaro Cárdenas, Salina Cruz, Tampico, Coatzacoalcos, Tuxpan), and these could be left out of the network if they fail to find specific markets where they can be competitive, or if they do not restructure their integration strategies, services and land-sea connections. Other feeders, such as Ensenada and Puerto Progreso, are finding market niches and effective operators to structure the requisite intermodal networks. These have better prospects of consolidating their position.

There are at least three ports that could move up in the hierarchy of the global port network. With their direct and feeder routes, larger vessels and frequent services to major destinations, Altamira, Veracruz and Manzanillo could reach an intermediate level as national hubs concentrating container cargo and distributing it along the Mexican Gulf and Pacific seaboards. In these three cases, cargo would be generated from the country's different inland regions.

It would be highly desirable to strengthen the inland connections of the main ports handling container cargo in the country. As was pointed out in the analysis in previous sections, almost all the cargo of ports with potential for flow concentration comes from their respective hinterlands, so the issue of modal integration should be given high priority. As of 2001, railway transportation played a negligible role in container cargo handling at ports like Veracruz and Altamira. Despite the potential advantage entailed by the presence of more than one railway operator, double-stack services have not yet come into operation, owing to the small cargo volumes attracted by this form of transport. The railway cannot continue to be left out of this process, as its cost advantages for high-volume long-distance cargoes could greatly strengthen the competitive position of Mexican Gulf ports.

At present, the port with the greatest potential as a future regional hub is Manzanillo. There are a number of factors which support this assertion. Firstly, it is on the axis where the routes of the east-west shipping corridor intersect with north-south routes. Secondly, owing to this, it is found to have more direct routes linked to the trans-Pacific corridor and to the trans-Atlantic corridor as well. Thirdly, the largest container ships ever seen along the Mexican coast have begun to call in there. The combination of these three factors gives Manzanillo the opportunity to develop progressively as a regional trans-shipment centre for Central and South American feeder routes and liners requiring a wider range of connections with Asia and Europe.

The rise of Manzanillo to the status of regional hub is not guaranteed and will depend both on the international competition environment and on the policies and actions of the public, private and social sectors as they relate to the development of the port. To realize the port's potential, it will be vital to pursue a strategic approach whereby long-term planning is carried out to respond properly to the demands this port hierarchy entails. Not only do reserve areas for new container terminals need to be identified in advance, but there needs to be planning of connections with land transport systems, cargo access and departure infrastructure, reserve areas for the development of intermodal terminals and logistical platforms for cargo consolidation and distribution, and shipping districts in general. In short, turning the port into a hub will involve a strategic conception with elements of long-term planning that looks beyond the precincts of the port and increasingly involves the outer harbour and its actors, the port city and its connections with the hinterland.

Lastly, to encourage trans-shipment of full and empty containers among Mexican ports and ensure that this activity, which is of greater and greater importance in intermodal transport networks, is integrated into the coasting trade, it is recommended that articles 71 and 72 of the Reglamento de la Ley de Navegación (Mexico, Federal Government, 1998) be reformed, as the conditions they place on links between coasting and ocean-going container traffic have only served to hinder port and shipping activity in the country. If these regulatory constraints were done away with, the benefits would far outweigh the disadvantages. Mexican ports could concentrate and move larger volumes of cargo if these "shackles" were removed. Similarly, the coasting trade would secure a new and hitherto unexploited market niche along the country's seaboards: the carriage of containers among Mexican ports, with the potential for linking up with international shipping routes by carrying out trans-shipment in one of the country's ports.

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